

DRIVER RESOURCE SERIES

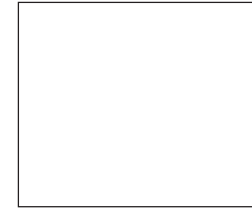
PO Box 87
St. Charles, IL
60174-0087



First Class
U.S. POSTAGE
PAID
AMTS

**Pat Lazzaro - Champion Race Car Driver
& Consumer Education Specialist**

Pat Lazzaro, an auto racer and certified mechanic, is a champion both on and off the track. Her racing career highlights include appearances in the Formula Mazda, Formula Ford and the Shelby CanAm Pro Series. As the first woman graduate from the prestigious Russell Racing School's mechanic's training program, Pat holds a tremendous wealth of knowledge when it comes to car care. She has shared that knowledge with millions of Americans while acting as spokesperson for MasterCare® Car Care Clinics and the Firestone Driver Resource Series.



Sample A. Sample
1234 Main Street
Anytown, USA 12345

DRS-B6-10/02

Volume Six

6



Don't Fuel Around
Understanding Your Vehicle's
Fuel & Emissions Systems

DRIVER RESOURCE SERIES



**Pat Lazzaro - Champion Race Car Driver
& Consumer Education Specialist**



Dear Valued Firestone Customer –

When it comes to your vehicle's fuel and emissions systems, you can't afford to "fuel" around. The two systems work together in many ways to deliver engine power, fuel economy and cleaner exhaust emissions that help save you money and protect our environment.

Neglecting problems in either system can result in rough engine operation, poor fuel economy – even no-start conditions – and dirty emissions that may put your vehicle at risk of not meeting your state's emissions standards.

Proper maintenance of these systems starts with you. A basic understanding of what they do, how they work and what can go wrong with them will help you more comfortably discuss concerns with your service technician. That's why we're pleased to present you with **Don't Fuel Around – Understanding Your Vehicle's Fuel & Emissions Systems**, the latest car-care booklet in our Firestone Driver Resource Series.

For future reference of these tips, may we suggest that you keep the booklets in this series in your glove compartment or wherever you store your vehicle maintenance records.

Our goal is to make vehicle care easy so that you can spend more time driving and enjoying your vehicle.



Happy driving – and we look forward to being with you again soon.

Pat Lazzaro

FIRESTONE DRIVER RESOURCE SERIES
With Pat Lazzaro – Champion Race Car Driver & Consumer Education Specialist

www.MasterCareUSA.com

BONUS SAVINGS COUPONS

These valuable offers are yours to use immediately. Visit your local Firestone Tire & Service Center and start saving today!

Firestone **MasterCare** Car Service

MasterCare® PREFERRED CUSTOMER SAVINGS COUPON

LUBE, OIL CHANGE AND FILTER

- Install new filter
- Includes refill of up to 5 quarts Kendall® 10W-30 motor oil
- Lubricate chassis (if applicable)

\$14⁹⁹

Most vehicles.
Price includes oil disposal fee.



Offer ends 12/31/03

MasterCare® PREFERRED CUSTOMER SAVINGS COUPON

FUEL SYSTEM TUNE-UP

- Inspect fuel system and intake
- Chemically clean fuel injectors with Wynns Fuel System cleaner
- Supply fuel additives & cleaners

\$69⁹⁹

Most vehicles.



Offer ends 12/31/03

MasterCare® PREFERRED CUSTOMER SAVINGS COUPON

COMPLETE VEHICLE INSPECTION

In-depth visual analysis of major systems: Tires, Suspensions, Brakes, Fluid Levels, Filters, Lights, and more.

FREE

Most vehicles.



Offer ends 12/31/03

Drive wisely and lower emissions

Even a perfectly maintained vehicle will pollute more than necessary if it is driven carelessly. By applying common sense when driving and following these basic rules, you can help reduce the impact of harmful emissions on our fragile environment.

IDLING:

You will save gas by turning the engine off and restarting it again if you expect to idle for an extended period of time. Try to avoid long drive-up lanes at your bank or favorite fast food restaurant.

STOP-N-GO DRIVING

Driving in traffic is not always avoidable. Whenever possible plan trips outside peak traffic periods. Try to “smooth” out your driving with gradual starts and stops.

HIGH ENGINE LOADS

Your vehicle burns more fuel and emits more pollution when operating under high load; that is, when working especially hard. Extra load is created by running the air conditioner, quick accelerations, high-speed driving, climbing grades, revving the engine, and carrying extra weight.

COLD TEMPERATURES

Today’s vehicles need little warmup; they’re most efficient when being driven. Idling for long periods in cold weather can actually cause excessive engine wear.

REFUELING

Spilled fuel pollutes the air when it evaporates. It’s best to avoid “topping off,” especially in hot weather, to prevent spills and overfilling.



Your local Firestone Tire & Service Center is fully equipped to handle all of your vehicle’s fuel and emissions systems needs. Properly functioning fuel and emissions systems are essential for increased fuel economy and your vehicle’s ability to pass most state’s emissions standards.

5

FIRESTONE DRIVER RESOURCE SERIES

No fueling around...

Today’s internal combustion engine is a marvel of modern engineering and computer-aided technology. It features sophisticated fuel and emissions systems that work together to keep the engine in tune – producing optimum power, enhanced fuel economy – and cleaner exhaust emissions.

To achieve peak performance, these systems are continuously monitored by sensors and controlled by an onboard computer called an Powertrain Control Module (PCM - available on models manufactured since the early 1980’s).

To service these systems, special diagnostic tools in the hands of a qualified service technician are usually required and definitely recommended.

How your fuel system works

As a liquid, gasoline does not burn well. In order for your vehicle to run, the fuel must be converted into a vapor that burns easily when ignited. To do this, the fuel system pumps gasoline from the fuel tank through a fuel filter into the fuel injectors or a carburetor, and then into the intake manifold where it is combined with air to form a vapor. In turn the air-fuel mixture is carried to the engine’s combustion chamber where it is ignited by the spark plugs. Your Vehicle’s Fuel system consists of:

1. *The Fuel Tank – Stores the gasoline*
2. *Fuel Line – A conduit for transporting fuel throughout the system*
3. *Fuel Pump – A device that pumps fuel from the tank and delivers it to the fuel system (through the fuel line)*
4. *Fuel Filter – A replaceable part that is used to keep contaminants out of the fuel used by the engine.*
5. *Fuel Injectors/Carburetor – See sidebar below*

Many vehicles manufactured since the early 80’s utilize a series of key sensors that monitor the fuel system and provide feedback to the PCM (Powertrain Control Module) where adjustments are electronically made to insure that the air-fuel mixture is always at optimum levels for peak driving performance.

Fuel Injection vs. Carburetors – A Burning Difference

A vehicle with fuel injection doesn’t have a carburetor; the fuel injector injects electronically metered fuel into the intake manifold which directs the fuel to each cylinder for burning.

VS.

A carburetor is a mechanical device and not electronically controlled. The carburetor provides a stream of fuel into passing air that is then distributed to the engine’s cylinders for burning.

FIRESTONE DRIVER RESOURCE SERIES

2

The Emissions System

Today's automobiles feature emission-control systems designed to reduce exhaust gases and prevent harmful emissions from polluting the environment. There are many elements that comprise your vehicle's emission control system, some you might recognize, and others probably not. Listed below are some of the basic components you should familiarize yourself with.

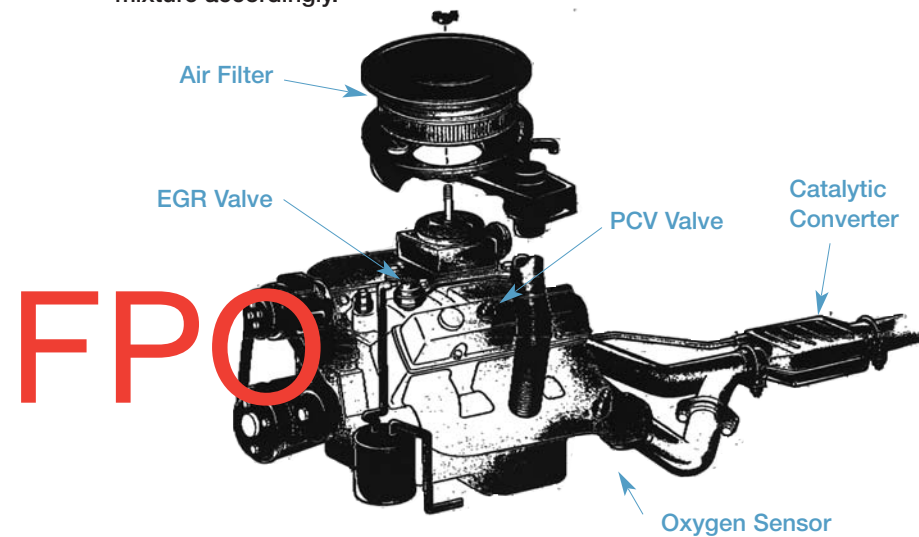
Catalytic Converter – Converts exhaust gas hydrocarbons and carbon monoxide into carbon dioxide and water. It also reduces oxides of nitrogen levels in the exhaust. Simply put, the catalytic converter changes pollutants into less harmful elements.

PCV (Positive Crankcase Ventilation) – One of the original emissions technologies, the PCV funnels unburned vapors from the crankcase to the intake manifold where they are burned off.

EGR Valve (Exhaust Gas Recirculation) – The EGR valve opens a small passageway between the exhaust and intake manifold to allow a metered amount of exhaust to flow back into the engine. This reduces combustion temperatures to help control the formation of oxides of nitrogen.

Air Filter – A replaceable device used to remove dust and dirt from the air being drawn into the engine.

Oxygen Sensor – Measures the oxygen content in the exhaust and relays that information back to the PCM (Powertrain Control Module). Excess oxygen indicates a lean running engine that needs more fuel. Too little oxygen indicates an overly rich mixture that is using too much fuel. To compensate for either scenario, the PCM adjusts oxygen-fuel mixture accordingly.



3

FIRESTONE DRIVER RESOURCE SERIES

Your Role in Optimum Engine Performance and Clean Emissions

A properly functioning vehicle emissions system is essential, not only for increased fuel economy, but also to keep your vehicle in compliance with various state and federal emissions standards. To keep your vehicle's fuel and emissions system operating at their peak:

- Always use the fuel octane rating recommended by your vehicle's manufacturer.
- For cold winter driving, add a fuel anti-freeze product to remove moisture in your fuel tank.
- Add a liquid fuel injector cleaner product to the fuel tank to remove any build up of gasoline gum and varnish residue in fuel injectors. If the fuel injector additive doesn't help, a complete fuel system tune-up may be necessary.
- As you drive, be alert to decreases in fuel economy and rough engine operation. Other trouble signs are an engine that won't start, or once started fails to run, and decreased performance at cruise speeds.
- A Check Engine or Service Engine Soon light on the instrument panel that stays illuminated after you start the engine may signal trouble ahead – but don't panic. First check to see that your fuel cap is secured tightly: a loose cap can cause emissions to escape and trigger the light. If the cap is tight and the light remains on, schedule an appointment to have your certified technician run a check of the vehicle's onboard diagnostic system to locate any problems and repair if necessary.

Remember to check your tire inflation! Properly inflated tires are essential for achieving maximum performance and mileage. Vehicle manufacturers will list recommend tire pressures for original tires in the owner's manual or on a placard on the end of the driver's side door or in the glove box.



FIRESTONE DRIVER RESOURCE SERIES

4